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MANUAL

FOR

BRICKBUILDERS.

BY

W. D. RICHARDSON.

Published by

THE OHIO MINING AND MFG. CO.

NEW YORK.

1900

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PREFACE.

We have aimed to make this little book something more than a pocket catalogue, illustrating the various forms of face brick that we manufacture. We have endeavored to make it a manual of useful information for those who, like the author, are giving their best energies to the building of more comfortable, more durable and more artistic habitations out of burned clay—the only building material that possesses the strength and virtue to meet every requirement.

The information given herein has been drawn from our own practice and observation, as well as from various sources of technical knowledge, too numerous even to mention in our limited space.

We trust that this hand-book may be deemed worthy of preservation, and be of service to all who may consult it.

Corrections or suggestions for future editions will be thankfully received.

Shawnee, Ohio, July 1, 1900.

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Brick as a Building Material.

The increased use of clay products in building construction is one of the most notable and significant features of modern architecture. In America, especially, the closing years of the nineteenth century have marked a change from temporary and wasteful methods to those more permanent and economical; from the construction of buildings of the perishable, inflammable wood, to those of the durable, indestructible brick. This change has been brought about the more readily because of the growing scarcity and increased cost of lumber, from the gradual destruction of our forests, as well as by reason of improvements in the manufacture, out of the abundant and widely distributed clay, of the many colored, artistic and durable forms of brick and terracotta.

The rocks of the earth crumble and disintegrate, and the best building stones go to pieces in a conflagration, but a well-made, hard-burned brick withstands the elements and endures forever.

This fact is now so well recognized as to need no argument, and thus the prophecy of the poet is fulfilled:

"Beneath a surface rough or gay,
There lies a solid worth
Deep hidden in the earth,
Which shall be found some day;
Then stately buildings shall arise,
And all mankind shall learn to prize
The strength and virtue in the common clay."

= = Kinds of Brick = =

Brick are classified either according to the method or process of making as soft-mud, stiff-mud or plastic, and dry pressed; or according to their use, as building brick—including common brick and pressed or face brick—paving brick, fire brick, etc.

SOFT-MUD BRICK.

Before the advent of machinery for making brick all brick were soft-mud brick, as this is the only process by which brick can be made by hand. Soft-mud brick are now generally made by machinery, which does not much reduce the cost of making, but produces a better brick and requires less skill and less hard labor. Soft-mud brick are molded by using sand to keep the clay from sticking to the mold, and hence are often called sand-molded brick, the sand finish on the face of the brick being sometimes desired. The higher grades of fire brick are made by this process.

Soft-mud brick are light and porous, make a good bond with mortar when well wetted, and are specially adapted for walls above ground, in low or moderately high buildings, though a well made, hard-burned, soft-mud brick of the right material is an excellent brick for almost any purpose. Bricklayers prefer them, because of their light weight, and because they are easily broken with the trowel.

STIFF-MUD BRICK.

The stiff-mud is a more modern process than the soft-mud, and differs from it in that the clay is worked stiffer, with less water. The clay, after having been ground and pugged, is forced through a die at the mouth of a cylinder by means of an auger or plunger, and issues in a solid bar of clay, which is cut into bricks of the required size by wires, and hence the brick are often designated wire-cut brick; and also when the section of the bar of clay is the same as that of the side of the brick they are called side-cut brick; and when the section of the bar is the same as the end of the brick they are called end-cut brick.

The stiff-mud brick is denser and heavier than the soft-mud, is less absorptive and will stand a greater crushing strain; hence is better adapted for foundations and piers of tall buildings, for tunnels and for street pavement.

It is by this process that drain tile and sewer pipe are made, and also paving brick. As stiff-mud brick are heavier and do not break so easily or squarely with trowel as soft-mud brick, bricklayers in some localities are opposed to them.

DRY PRESSED BRICK.

The dry-press or dry-clay process is the most modern method of making brick, and has reached its highest development in America. The clay is finely pulverized in a dry or semi-dry condition, and automatically fed into molds and subjected to

enormous pressure by large heavy steam power or hydraulic presses. This process is especially adapted to the manufacture of fine face brick, as it is the only practicable process for the making of a mechanically perfect brick.

The dry-press process, when properly conducted, is the most expensive method of making brick, requiring a large investment of capital and considerable skill and knowledge to operate successfully.

In some sections there is considerable prejudice against dry-pressed brick, caused by the poor quality of many of these brick that have been made, and some that are still made, by poorly equipped or incompetent manufacturers. A good dry-pressed brick is heavy, dense and homogeneous in structure, with no grains perceptible to the naked eye, a perfect parallelopiped, faces smooth, edges sharp, burned hard, and showing a smooth, square fracture with hammer or trowel, leaving no spalls. It is not practicable to make dry-pressed brick strictly impervious, but the best dry-pressed brick are admirably adapted for the facing of buildings and for fine interior work, mantels, floors, etc.

Most of the fine face brick in this country are made by this process, as are also all the fine art tiles, encaustic tiles and mosaic tiles.

= = Process and Quality = =

The foregoing classification of brick according to the process of manufacture should not be defined in the specifications of architects or engineers. The specifications should clearly state the requirements and the tests to which the brick must be subjected for the special purpose for which they are to be used, and leave it to the manufacturer to meet these requirements by any process he may find most practicable. There should be no prejudice for or against any process, but the specifications should be such as to shut out ignorance, carelessness or greed, on the part of the manufacturer by any process. No process will or should become universal. Each process is the best under certain conditions and for certain purposes.

= = = Face Brick = = =

Face Brick is the most accurate designation for brick that are made specially for the facing of buildings, either exterior or interior. Face brick are made mostly by the dry-press process, though a large part also are made by the stiff-mud process, being repressed to secure more perfect edges and special shapes. Repressed brick are not as perfect in texture, form or finish as the dry-pressed brick, but when well burned are more impervious to moisture, and hence are preferred for some purposes.

The test for imperviousness, however, for the purpose of securing a wall that will keep clean in smoky cities, is often carried to absurd limits under conditions not attained in practice. A fine-grained, hard-burned dry-pressed brick will often keep as clean in the wall as an impervious repressed brick by reason of the fact that the faces are so much smoother. Moreover, it has been proved by elaborate experiments upon flooring tile that the absorptive power of the tile is not always a gauge of its power to keep clean—some tile that absorbed only $\frac{1}{10}$ per cent getting much dirtier than others that absorb $1\frac{1}{2}$ per cent of water. No brick, not even an enameled or glazed brick, will keep clean in a smoky city, though a glazed brick and some impervious brick can be cleaned or washed better than a dry-pressed brick, but as exterior brick-work is seldom cleaned after the building is finished,

this quality of imperviousness does not cut much of a figure except as an argument for selling the brick.

However, imperviousness of face as indicative of good clay and proper manufacture is a valuable quality of brick that are to be used for exterior facing, and, *other things being equal*, the brick that will absorb the least water through its face is to be preferred.

COLOR OF FACE BRICK.

Color has in recent years become an important feature of brick architecture. The polychrome effect of the brickwork in our modern cities adds much to their beauty and interest. Architects now make a careful study of colors for each building to ascertain what color will best harmonize with its surroundings, and how to use properly more than one color in the same front, and thus make the most of the materials so bountifully provided by nature in her clays. Face brick are now made in any color desired.

Our system of designating colors and shades by numbers, 1 to 99, will be understood from the following table:

COLOR.	White.	Speckled White.	Buff.	Gray.	Speckled Gray.	Red.	Brown.	Pink.	Gold Flashed.	Bronze Flashed.
NUMBERS.	1 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99

There may be ten shades of each color, the lowest number representing the lightest shade.

GRADES.

The impossibility of producing all the brick at any factory of uniform quality, of preserving throughout the manifold operations and handlings in the making, setting, burning, shading, piling and loading, perfection of form necessitates the sorting of the brick into grades according to the various defects that are found in them.

We sort our brick very carefully into four grades, designated A, B, C and D. Grades A, B and C, are uniform in shade and are stored in our stock sheds for the facing of buildings. *A* grade brick are as near perfection as it is practicable to make brick; *B* grade brick have no defects that will injure the durability of the wall or mar its appearance above the second story; *C* grade brick are a degree less perfect than the *B* grade, and are used for the facing of cheaper buildings, or in less prominent places; the *D* grade brick are piled outside upon our yard and sold at common brick prices, being sometimes used for side or rear walls where it is desired to have the color harmonize with the front of the building.

Brick for mantels and interior work are generally extra selected *A* grade stock, for which an extra price is charged.

. . Forms of Face Brick . .

Face brick are made in a great variety of shapes to suit the various forms of buildings and to carry out special schemes of ornamentation. Every large manufacturer must issue a catalogue illustrating the various shapes that he makes, and he should not put into his catalogue any shapes that he has not made and for which he has not the molds ready.

We are constantly adding to our stock of molds. If what you want is not shown here send us a sketch of the brick, or if made by another manufacturer, specify the catalogue and number, and if we haven't it in stock we will make it for you.

Since we now make so many colors and shades, it is impracticable to carry in stock all shapes in every shade. Hence architects should allow three to six weeks for the making of special shapes to order. Moreover, it is not always possible to produce molded brick of exactly the same shade of color as the plain brick. A slight variation is often necessary and is not objectionable.

The cuts in this catalogue are one-eighth size of brick, and the sizes named are for hard-burned brick made from our white clay. These sizes will vary somewhat with different colors and shades.

For a better understanding of the catalogue of Ornamental Brick, attention is called to the following definitions and abbreviations:

= = Definitions = =

The *Base* of a brick is the bottom or flat surface upon which the brick rests or bears in the wall.

The *Face* of a brick is the surface exposed to view in the wall.

The *Sides* of a brick are the opposite surfaces extending at right angles to the face and base in wall.

The *Back* of a brick is the surface opposite the face.

The *Top* of a brick is the surface opposite the base in wall.

The *Ends* of a brick are the smallest surfaces of the brick, and may form the face, back or sides in wall.

The *Edges* of a brick are the narrow surfaces, the dimensions of which are generally $2\frac{5}{16}$ inches by $8\frac{3}{16}$ inches, and may form the face, top and base or sides of a moulded brick in wall.

A brick may have two faces and two backs, and generally has two sides, two ends and two edges, but only one base or one top.

The *Projection* of a brick is the extension of the top of the moulded face beyond the bottom, or *vice versa*, or is the height of the relief—the extension of the ornamentation in front of the face of the wall.

Abbreviations

C.—Corner Block—External.

D.—Double Return, Return on Both Ends or Moulded on Both Ends.

E.—External Angle.

F.—Face Return.

F. I.—Face Return In.

F. O.—Face Return Out.

H.—Header.

I.—Internal Angle or Circle.

L.—Left Return.

R.—Right Return.

R. F.—Right Face Return.

L. F.—Left Face Return.

S.—Stretcher.

T.—Starter or Terminal.

V.—Single Mold on Stretcher.

W.—Double Mold on Stretcher.

X.—Mould on Header.

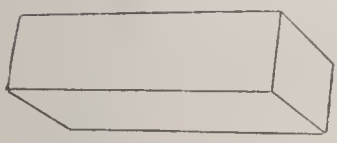
Cuts in this catalogue are about 1/8 size.

Shallow Mould Brick.

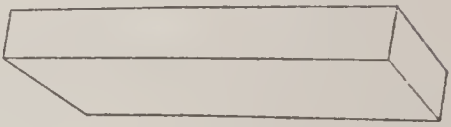
Nos. 100 to 199

PLAIN RECTANGULAR BRICKS.

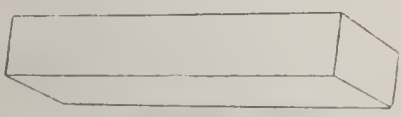
Nos. 100 to 105.



No. 100—Standard.
$2\frac{5}{16}$x$8\frac{3}{16}$x4 2c.



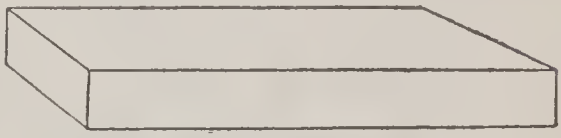
No. 101—Roman.
$1\frac{1}{2}$x$11\frac{3}{4}$x4. $2\frac{1}{2}$c.



No. 102—Norman.
$2\frac{5}{16}$x$11\frac{3}{4}$x4. 3c.

No. 103—Bond Brick.
$2\frac{5}{16}$x$8\frac{3}{16}$x$8\frac{3}{16}$. 4c.

No. 104—10x4. 3c.

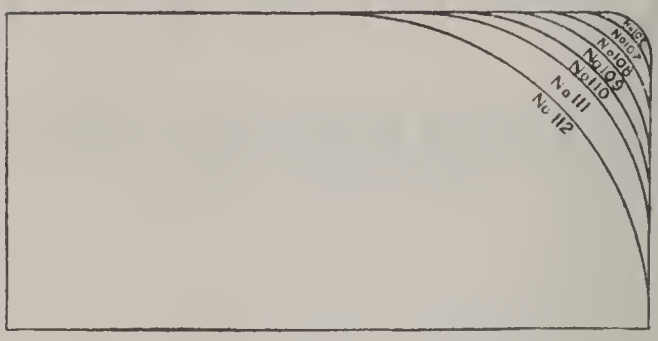


No. 105—$11\frac{3}{4}$x$5\frac{3}{4}$. $4\frac{1}{2}$c.

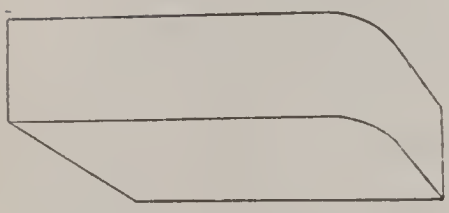
No. 104 and 105 made in Standard and Roman thickness for jambs and corners of Roman and Norman brick walls to preserve bond.

ROUND CORNER BRICKS.

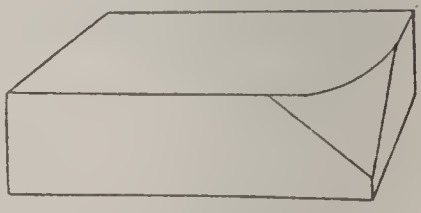
Nos. 106 to 114.



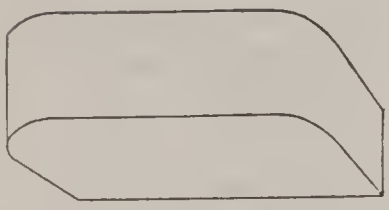
5c.



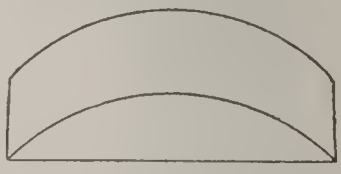
No. 109, 5c.



No. 109—T, 10c.
Starters for round corners, 10c.



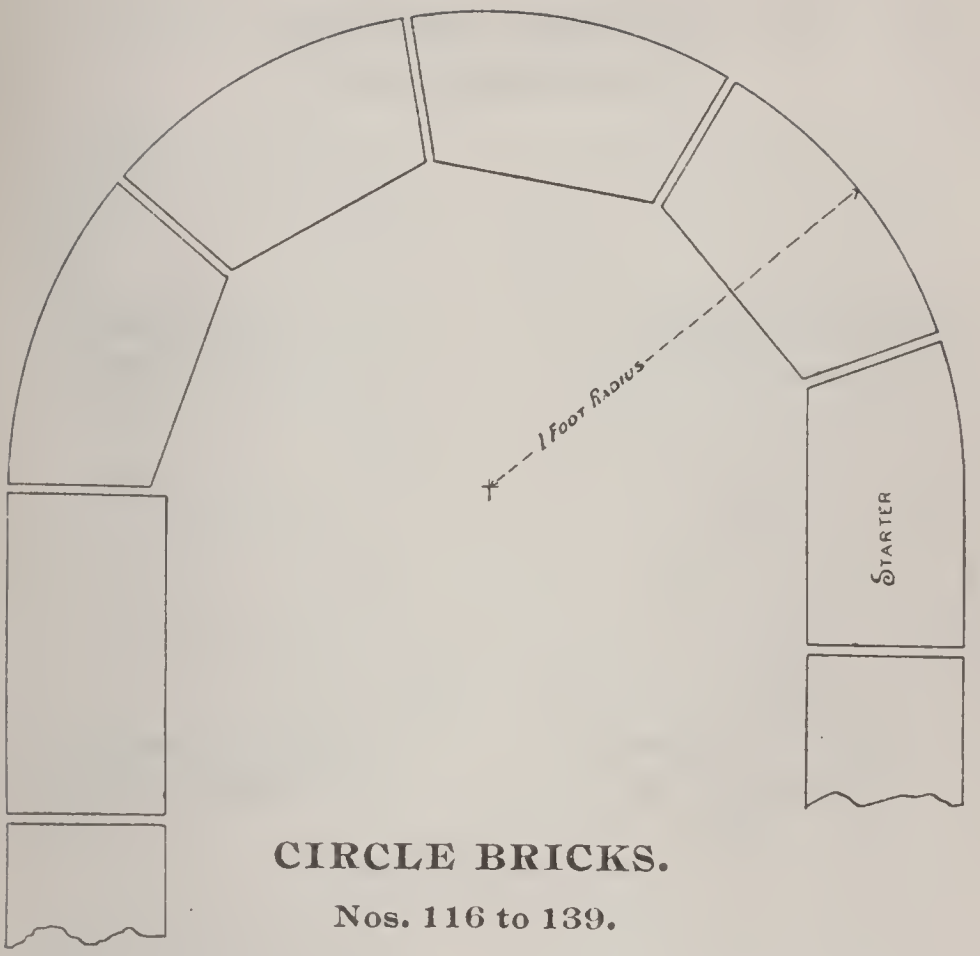
No. 109—W. 6c.



No. 112—W. Bonds with No. 112 and No. 117. 6c.

No.	106	Round Corner,		½	inch radius,	5c.
"	107	"	"	1	" "	5c.
"	108	"	"	1½	" "	5c.
"	109	"	"	2	" "	5c.
"	110	"	"	2½	" "	5c.
"	111	"	"	3	" "	5c.
"	112	"	"	4	" "	5c.
"	113					
"	114					

Made also Roman Size.



CIRCLE BRICKS.

Nos. 116 to 139.

No.	Diameter.	Price.	No.	Radius.	Price.
116	5 inches	6c	126	$3\frac{1}{2}$ feet,	5c
117	$8\frac{3}{16}$ "	$6\frac{1}{2}$c	127	4 "	5c
118	12 "	10c	128	5 "	5c
	Radius.		129	6 "	5c
119	6 inches	7c	130	7 "	5c
120	8 "	5c	131	8 "	5c
121	12 "	5c	132	9 "	5c
122	16 "	5c	133	10 "	5c
123	2 feet	5c	134	12 "	5c
124	$2\frac{1}{2}$ "	5c	135	*16 "	6c
125	3 "	5c	136	*24 "	6c

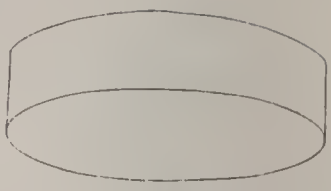
*Made only in Roman and Norman.

Circle brick with radius other than above, 1 cent each additional. Circle Brick in Roman size, 1 cent each additional.

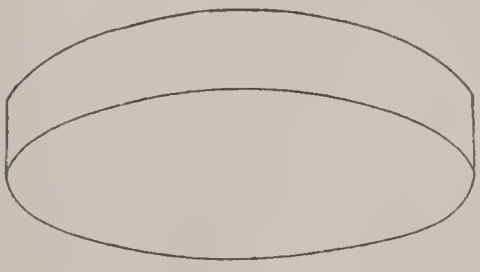
CIRCLE BRICKS.

For Veranda Columns.

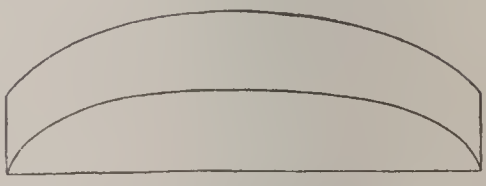
No. 116—Diameter
5 inches. 6c.



No. 117—Diameter
$8\frac{3}{16}$ inches. 6½c.

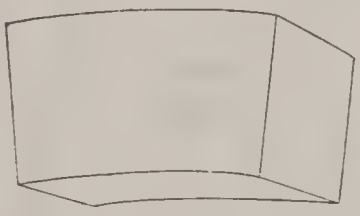


No. 118—Diameter
12 inches. 10c.

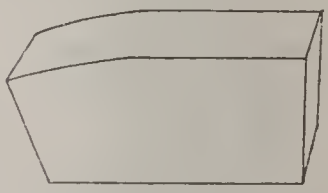


No. 119—Radius
6 inches. 7c.

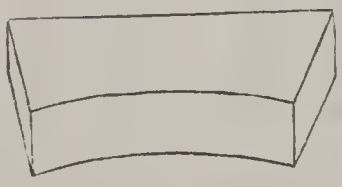
For Circular Bays.



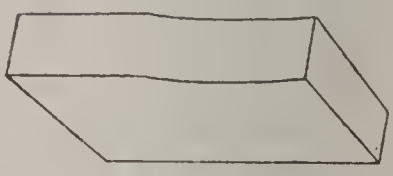
No. 127—Radius
4 feet. 5c.



No. 121—T.
Radius Starters, 6c.



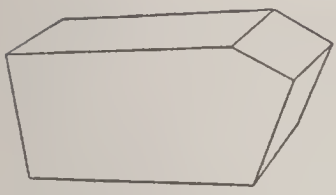
No. 122—I Internal
Radius 16 inches. 6c.



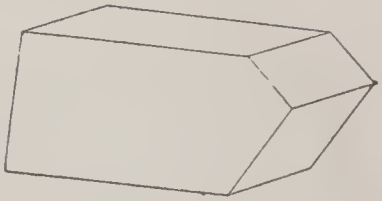
No. 121—I T Starter
for 121-I. 7c.

BAY WINDOW ANGLE BRICK.

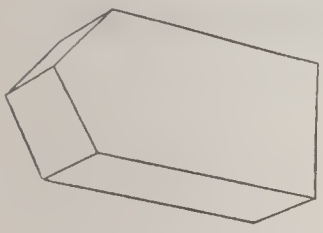
Nos. 140 to 149.



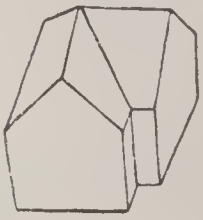
No. 140—Angle 25°.
5c.



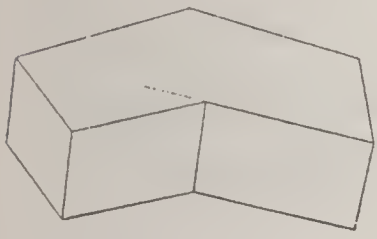
No. 141—Angle 30°.
5c.



No. 144—Angle 45°.
Standard Octagon. 5c.

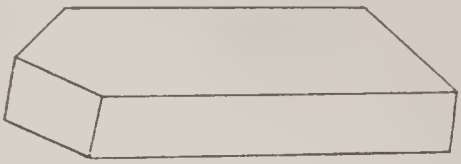


No. 144—F. I.
25c.



No. 148—Internal Angle 45°.

Starter for Octagon Bays. Used in alternate courses as a binder. 6c.

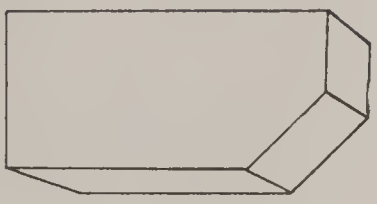


No. 144—Roman.
Roman Octagon.
6c.

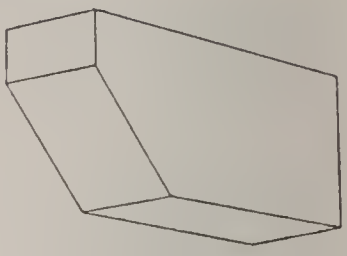
No. 140—Angle 25°, 5c.		No. 145—Angle 53°, 5c.	
" 141— " 30°, 5c.		" 146— " 60°, 5c.	
" 142— " 35°, 5c.		" 147—I. An. 34°, 6c.	
" 143— " 40°, 5c.		" 148 " 45°, 6c.	
" 144— " 45°, 5c.		" 149	

Any angle other than above made to order—Standard or Roman thickness, 1c. each additional.

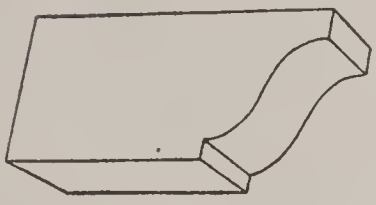
CORNICE, JAMB AND ARCH MOULDINGS.



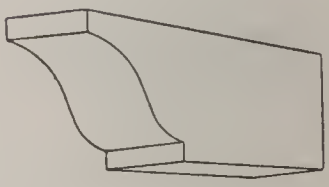
No. 150—Projection
2 inches. 6c.



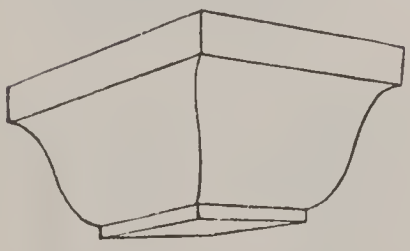
No. 151—Projection
2½ inches. 6c.



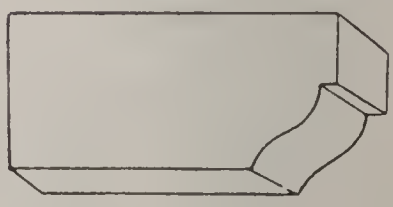
No. 152—Projection
3 inches. 6c.



No. 153—Projection
3¼ inches. 6c.

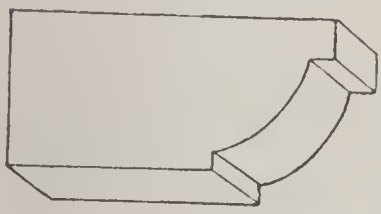


No. 152—C.
40c.

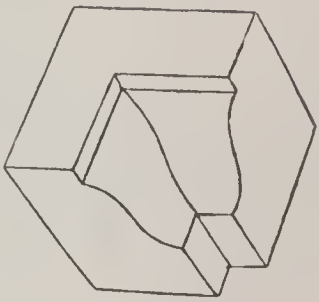


No. 154—Projection
2 inches. 6c.

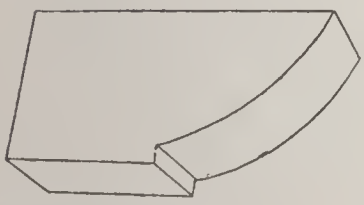
CORNICE, JAMB AND ARCH MOULDINGS.



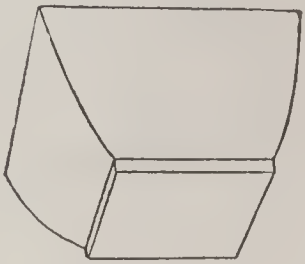
No. 155—Projection 3 inches. 6c.



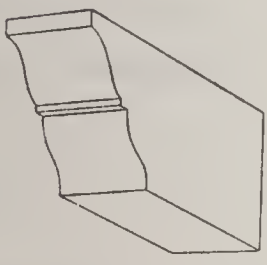
No. 154—F. I. 30c.



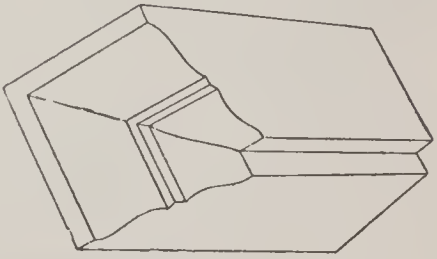
No. 156—Projection 2¾ inches. 6c.



No. 156—C. 40c.

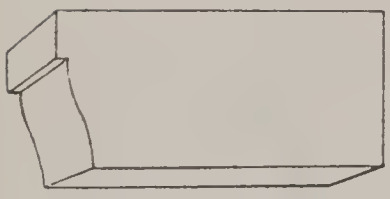


No. 157—Projection 3½ inches. 6c.

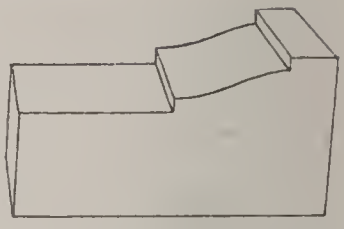


No. 157—F I. 30c.

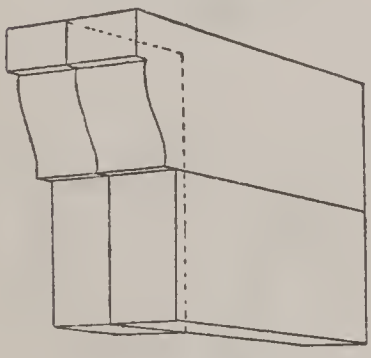
CORNICE, JAMB AND ARCH MOULDINGS.



No. 158 X—Projection
1 inch. 6c.



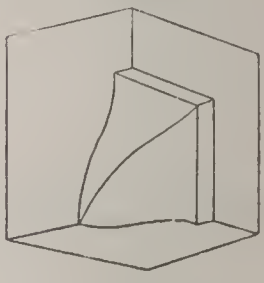
No. 158 V—Projection
1½ inches. 6c.



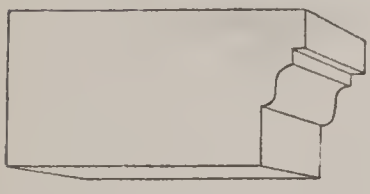
No. 158—V.

No. 158 X.

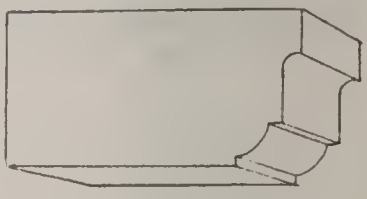
No. 100.



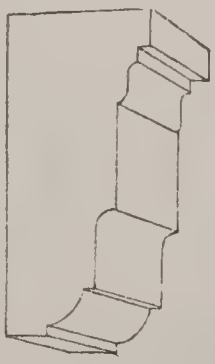
No. 158—X F.I.
30c.



No. 159—Projection
1 inch. 6c.

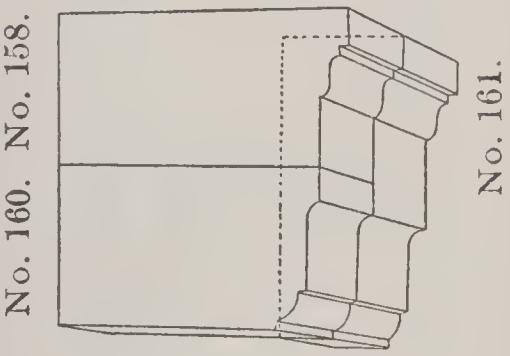


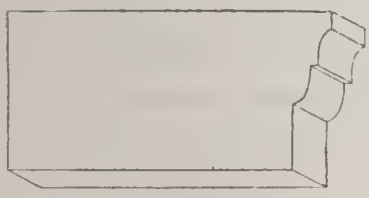
No. 160—Projection
1½ inches. 6c.



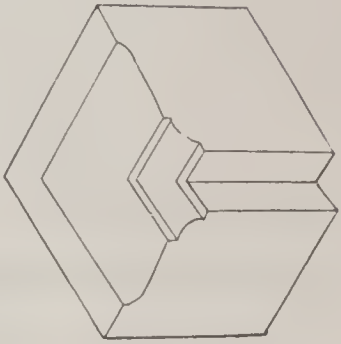
No. 161—Projection 2½ inches. 6½c.

CORNICE, JAMB AND ARCH MOULDINGS.

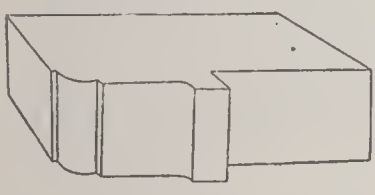




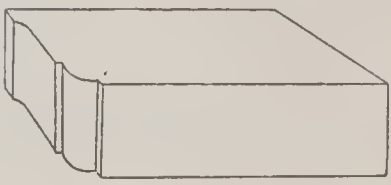
No. 162—Projection 1 in. 6c.



No. 163--F.I. 30c.

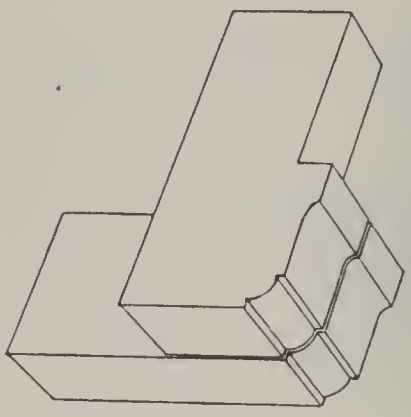


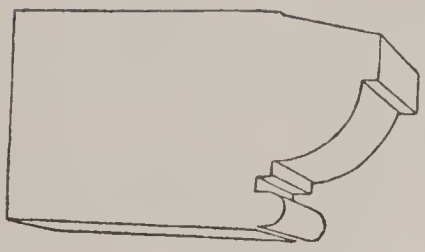
No. 163—V. Projection 1 inch. 6c.



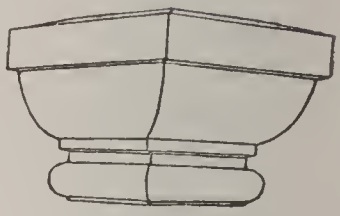
No. 163—X. Projection 1 inch. 6c.

CORNICE, JAMB AND ARCH MOULDINGS.

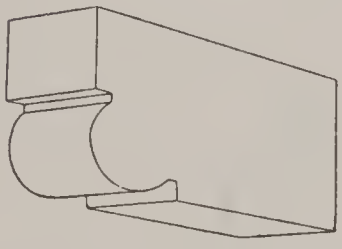




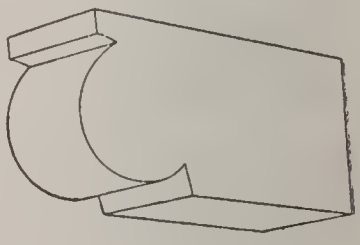
No. 164—Projection 2¾ in.
6 inches wide. 10c.



No. 164—C.
75c.

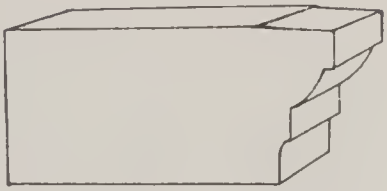


No. 165—Projection
2 inches. 6c.

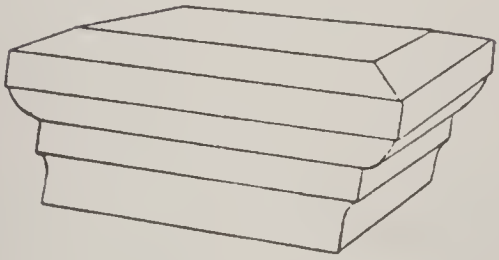


No. 166—Projection
3¼ inches. 6c.

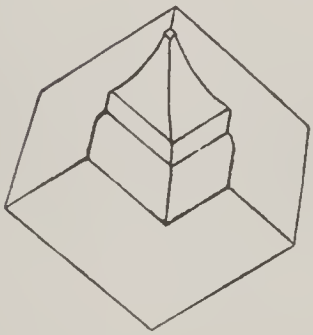
CORNICE, JAMB AND ARCH MOULDINGS.



No. 167—Projection
2 inches. 6c.

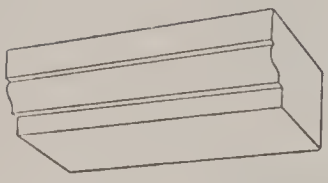


No. 167—C.
50c.

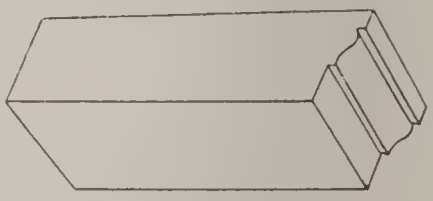


No. 167—I. 30c.

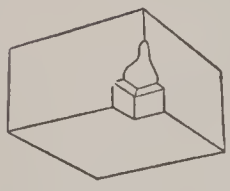
PANEL MOULDINGS.



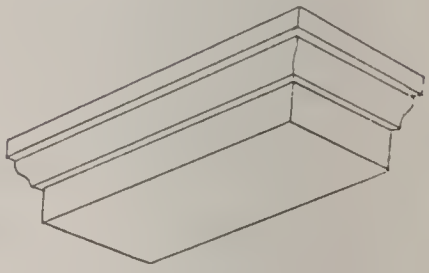
No. 168 S—Projection ⅞ inches. 8c.



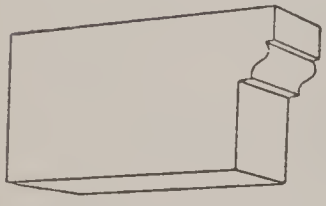
No. 168—H. 7c.



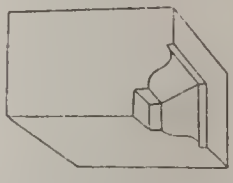
No. 168—I. 25c.



No. 168—R. 25c.

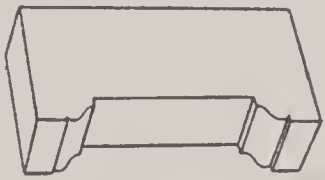


No. 168—X. 6c.

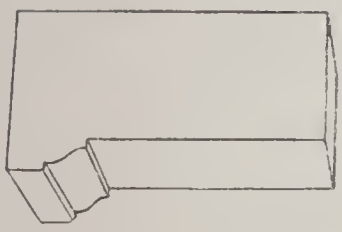


No. 168—F. I. 25c.

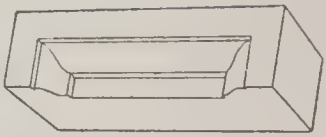
PANEL MOULDINGS.



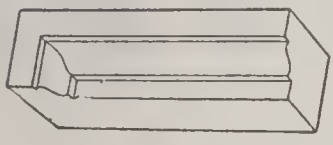
No. 168—W. 6c.



No. 168—V. 6c.



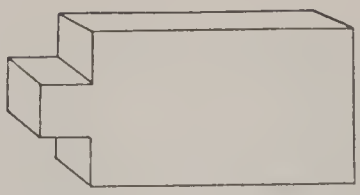
No. 168—W. T. 10c.



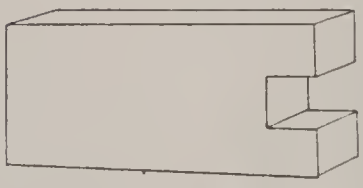
No. 168—L. T. 10c.

No. 168—R. T. 10c.

FOR CHECKER WORK.

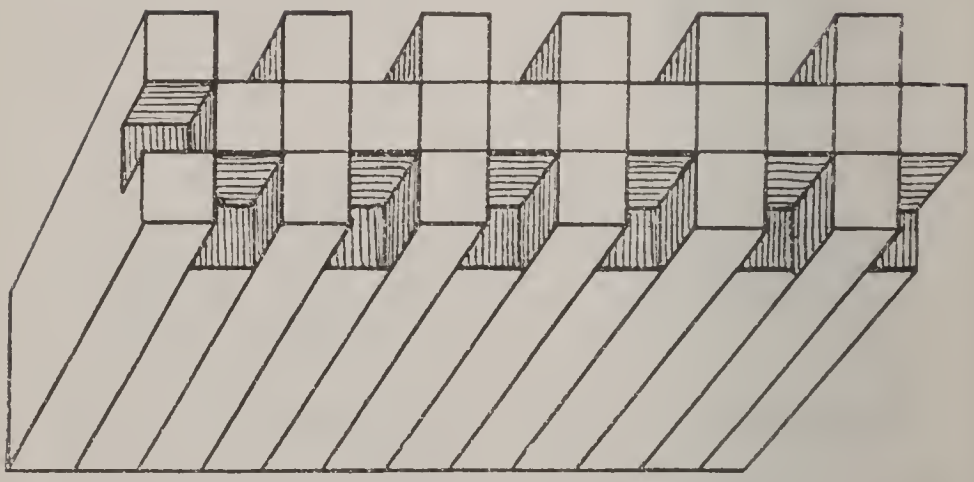


No. 169—Projection
1½ inches. 6c.

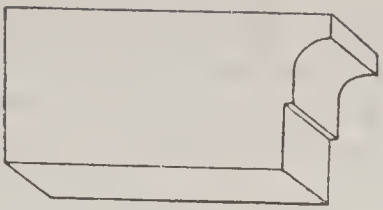


No. 170 6c.

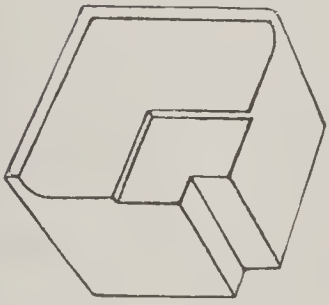
Made 1½ inches thick.



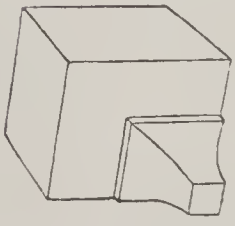
Nos. 169 and 170 in Combination.



No. 171—H. Projection
1 inch. 6c.



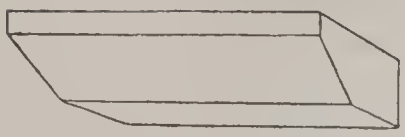
No. 171—F. I.
30c.



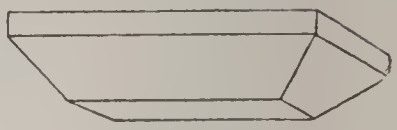
No. 171—F.O.
30c.

Deep Mould Brick.

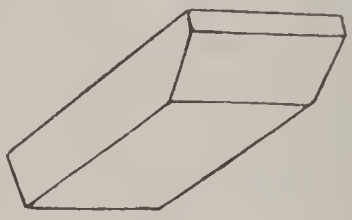
Nos. 200 to 299



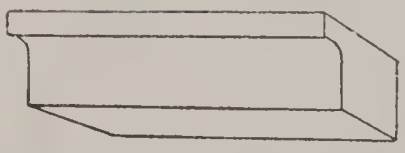
No. 200—S. Projection
1¾ inches. 8c.



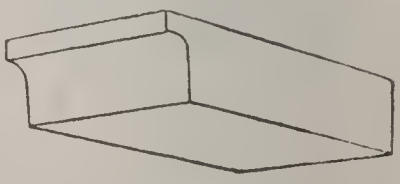
No. 200—R.
25c.



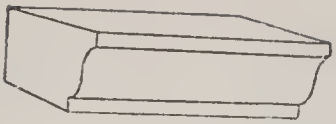
No. 200—H.
7c.



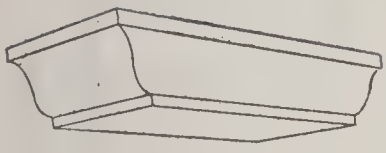
No. 201—S. Projection
½ inches. 8c.



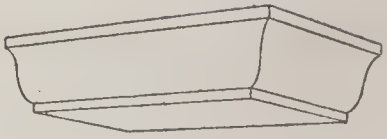
No. 201—H.
7c.



No. 202—S. Projection
1 inch. 8c.

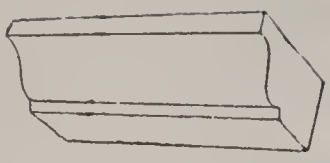


No. 202—R.
25c.

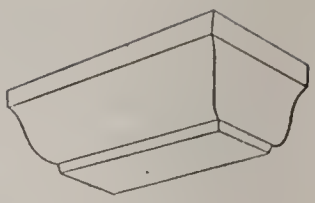


No. 202—L.
25c.

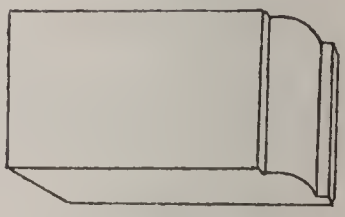
No. 203—S. Projection
1½ inches. 8c.



No. 204—S. Projection
2¼ inches. 8c.

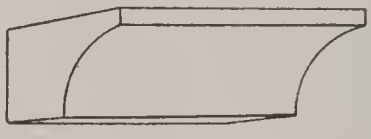


No. 204—R.
25c.

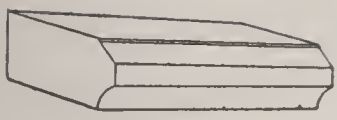


No. 205—S. Projection
1⅞ inches. 8c.

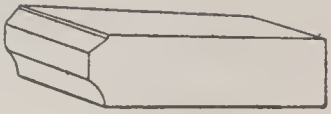
No. 205—H.
7c.



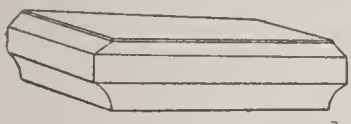
No. 206 S.—Projection
1¾ inches. 8c.



No. 207 S.—Projection
¾ inch. 8c.

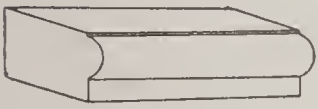


No. 207—H.
7c.

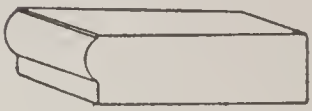


No. 207—L. 25c.

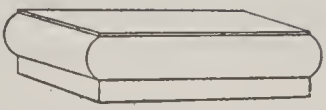
No. 208 S.—Projection
⅝ inch. 8c.



No. 209—S. Projection
¾ inch. 8c.

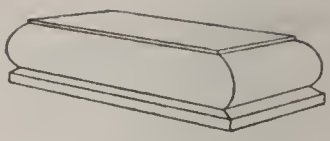


No. 209—H.
7c.

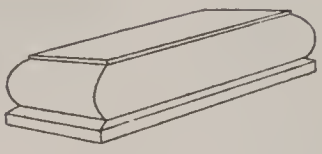


No. 209—L.
25c.

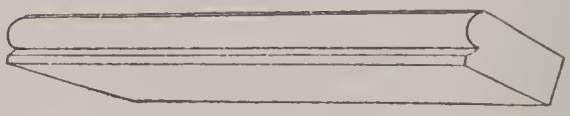
No. 210—S. Projection
1 inch. 8c.



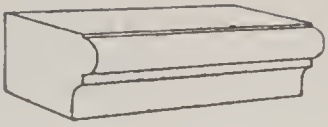
No. 210—R.
25c.



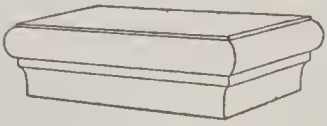
No. 210—L.
25c.



No. 210—S. Roman. Projection
¾ inch. 10c.

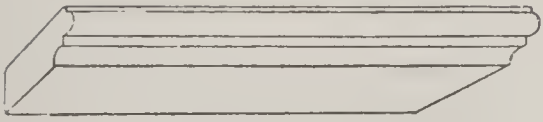


No. 211—S. Projection
⅞ inch. 8c.



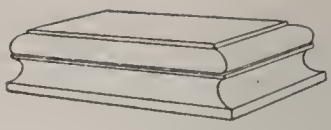
No. 211—R.
25c.

No. 211—L.
25c.

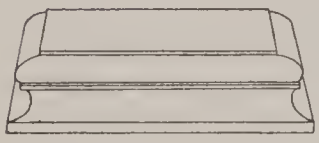


No. 211—Roman. Projection
⅝ inch. 10c.

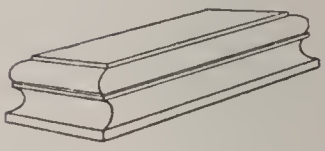
No. 212—S. Projection
1 inch. 8c.



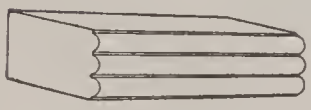
No. 212—R.
25c.



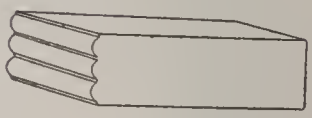
No. 212—D.
40c.



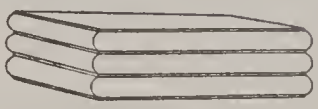
No. 212—L.
25c.



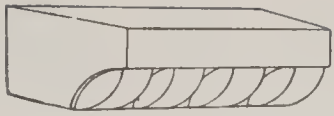
No. 213—S. 8c.



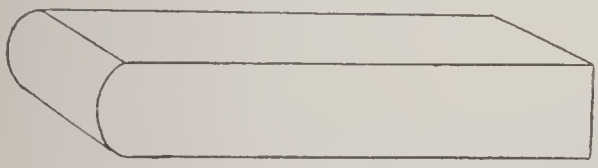
No. 213—H. 7c.



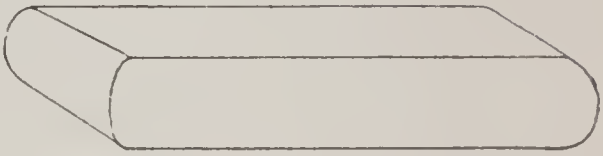
No. 213—R. or L. 20c.



No. 214 S.—Projection
1½ inches. 9c.

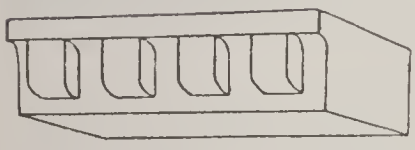


No. 215 H—6x12 inches. 10c.

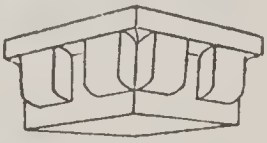


No. 215—R. or L. 30c.

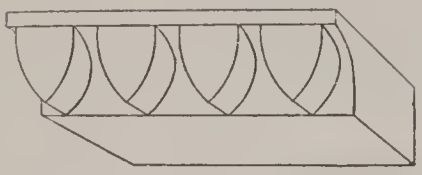
For Mantel Shelves.



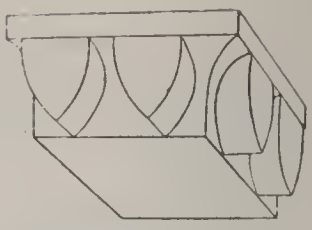
No. 216—S. Projection
½ inch. 8½c.



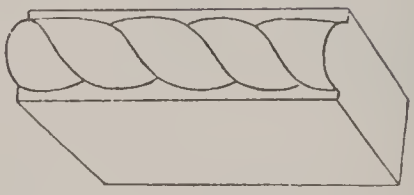
No. 216—C.
25c.



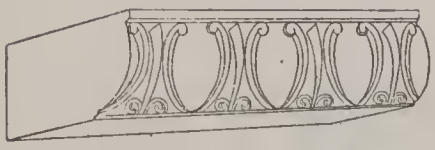
No. 217—S. Projection
1 inch. 9c.



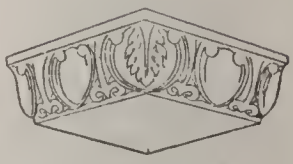
No. 217—C.
25c.



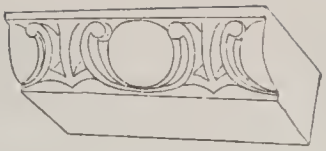
No. 218—S.
8c.



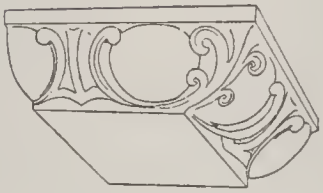
No. 219—S. Projection
1 inch. 8½c.



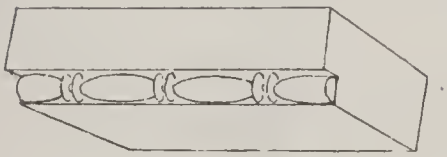
No. 219—C.
30c.



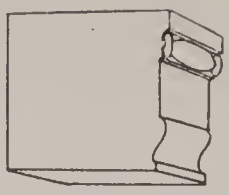
No. 220 – S. Projection
2 inches. 9c.



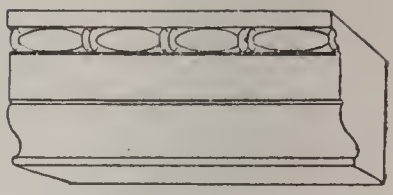
No. 220—C.
35c.



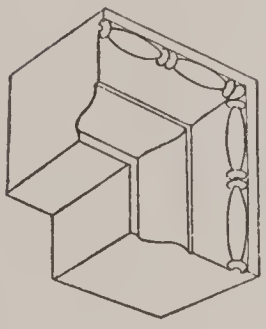
No. 221—S. Projection
¾ inches. 8½c.



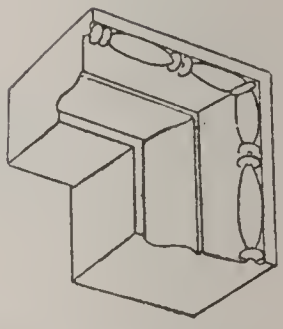
No. 222–H. Projection 1 inch. 8c.



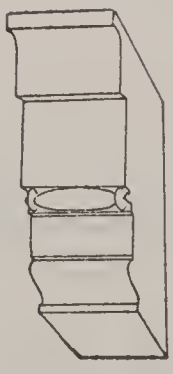
No. 222—S. 12c.



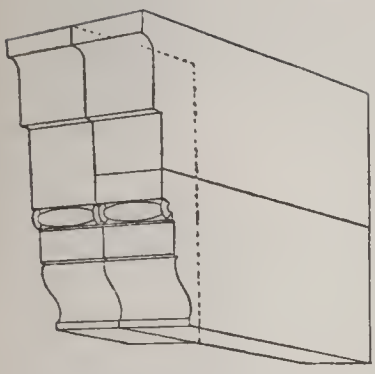
No. 222–F.I. 40c.



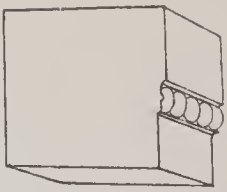
No. 222—F. I. Double Bolster. 50c.



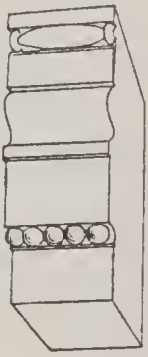
No. 223–Projection 2 inches. 8½c.



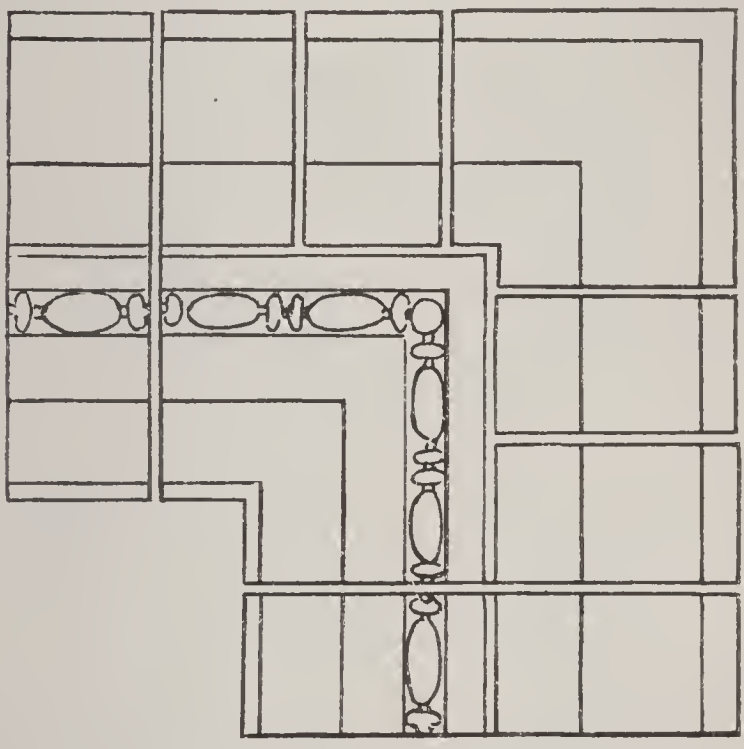
Combination of Nos. 171-H, 222-H and 223.



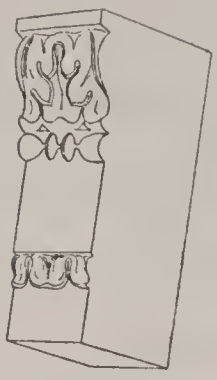
No. 224-H. Projection ½ inch. 8c.



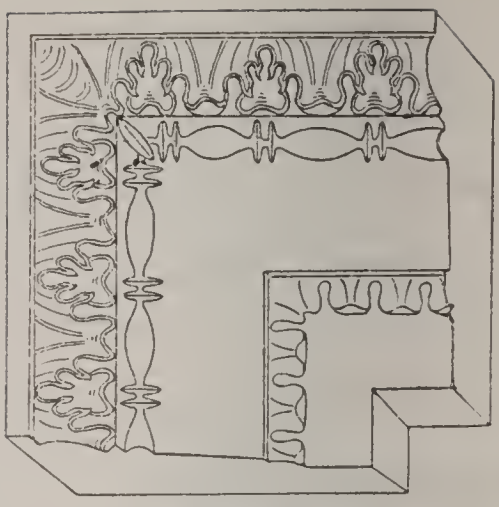
No. 225—Projection 1½ inches.



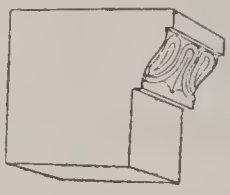
Face Return In. Made by Nos. 171-H, 223, 171-F. I. and 222 F. I. Double Bolster.



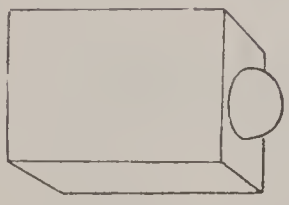
226—Projection 1½ inches. 9c.



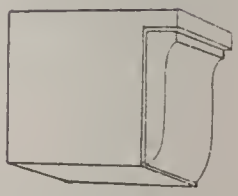
226—F.I. 75c.



227—H. Projection 1¼ inches. 8c.



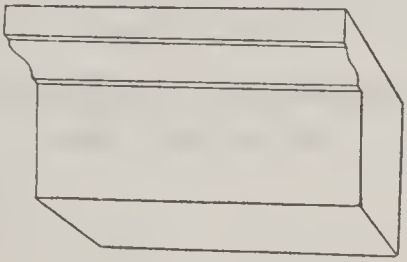
228 - H. Projection ⅞ inches. 8c.



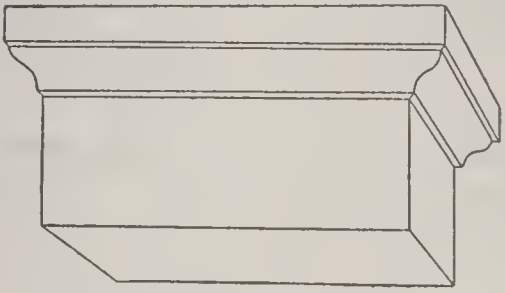
229—H Projection 1⅜ inch. 8c.

Brick Height of two Courses of Standard Brick

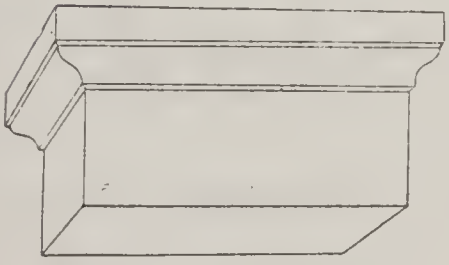
Nos. 300 to 399.



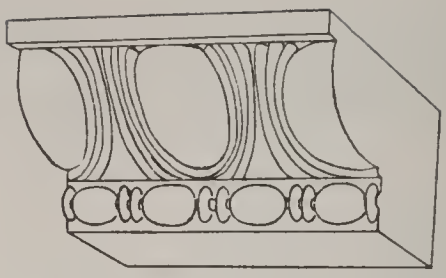
No. 300 S.—Projection 1½ inches. 14c.



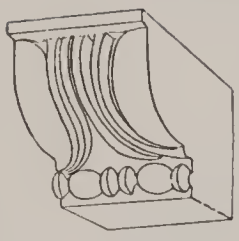
No. 300—R. 50c.



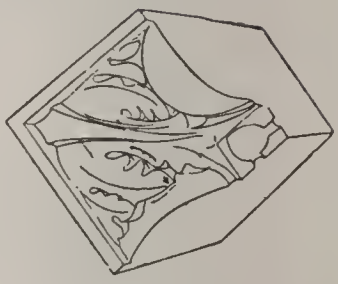
No. 300—L. 50c.



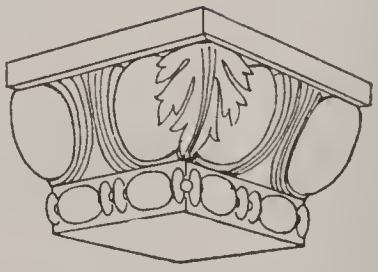
No. 310—S. Projection
2¼ inches. 20c.



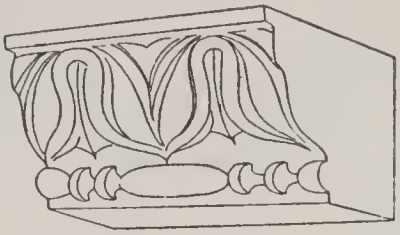
No. 310—H. 12c.



No. 310—F. I. 40c.

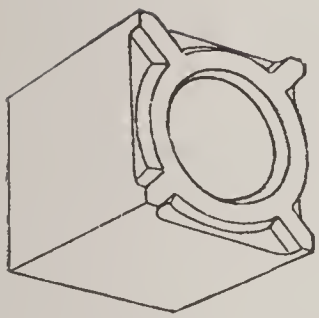


No. 310—C. 75c.

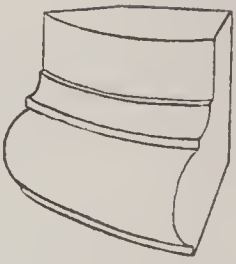


No. 311 S—Projection
2½ inches. 20c.

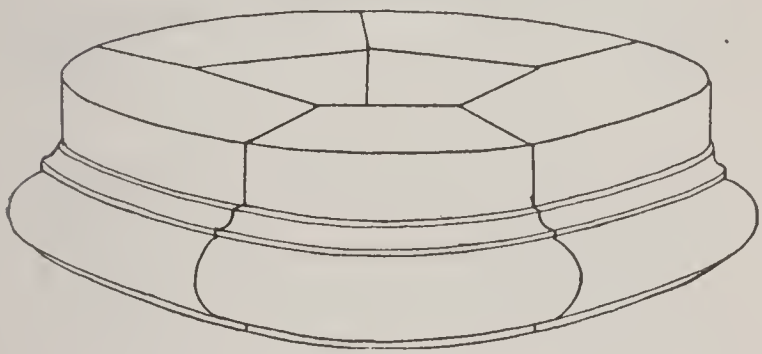
No. 311—C. 75c.



No. 312.
10c.



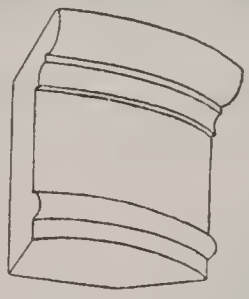
No. 313—Projection
1½ inches. 20c.



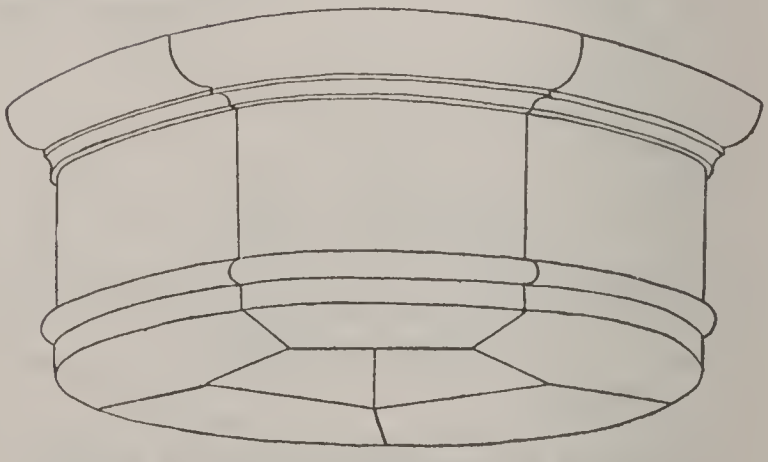
No. 313 in combination to form base of
12 inch round column.

Brick Height of Three Courses of Standard Brick

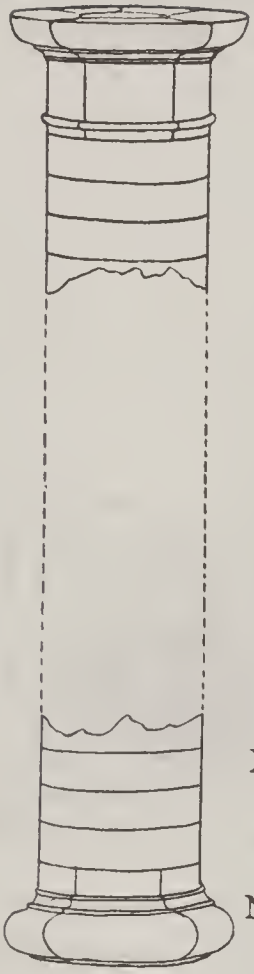
Nos. 400 to 499.



No. 400—Projection 1½ inches.
25c.



No. 400 in combination to form cap of 12 inch round column.



Round Column, 12 inches diameter.

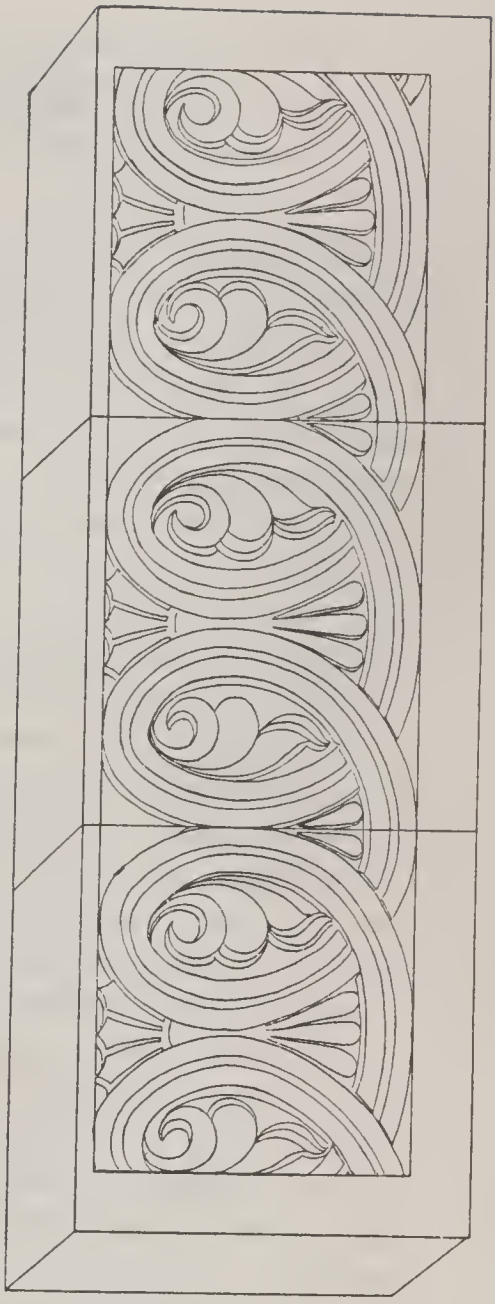
Other designs, tapered if desired, made to order.

Brick Height of Four Courses of Standard Brick

Nos. 500 to 599.

No. 500—Indian Head.
$1.00.

No. 505—L. T. 60c.



No. 505. 40c.

No. 505—R. T. 60c.

Arches

In sending us orders for arches please observe the directions upon the following pages.

If the specifiications include all details we will make the full size drawings ourselves without extra charge, and will mark each brick to correspond with the drawing.

When the brick are to be unpacked look first for the barrel containing the drawing, as indicated on the card attached.

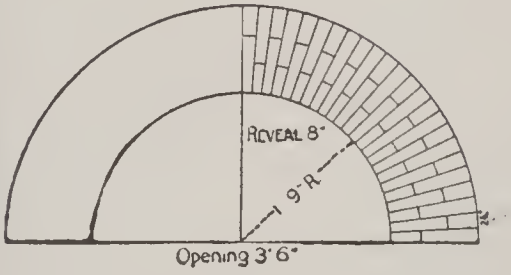
If the arch has skew-back or key of stone, full size drawings should be furnished us.

Architects should consider that we often have several orders for arches and can follow only one rule—first come, first served.

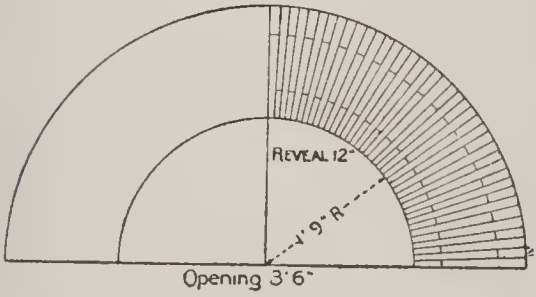
We burn most of our brick so hard that it is a slow and expensive process to grind them in the usual way, hence we generally prefer to press brick to required shape and burn them to match the square brick. This makes a better job in most cases, gives a smooth reveal, uniform in color with the face of the arch. This, however, takes time, and orders for arches should be sent us from four to eight weeks in advance of their being needed.

We provide for $\frac{3}{16}$ inch joints for standard brick and $\frac{1}{4}$ inch joints for Roman brick unless otherwise specified.

SEMI-CIRCULAR ARCHES.



Opening 3 ft. 6 in.



Opening 3 ft. 6 in.

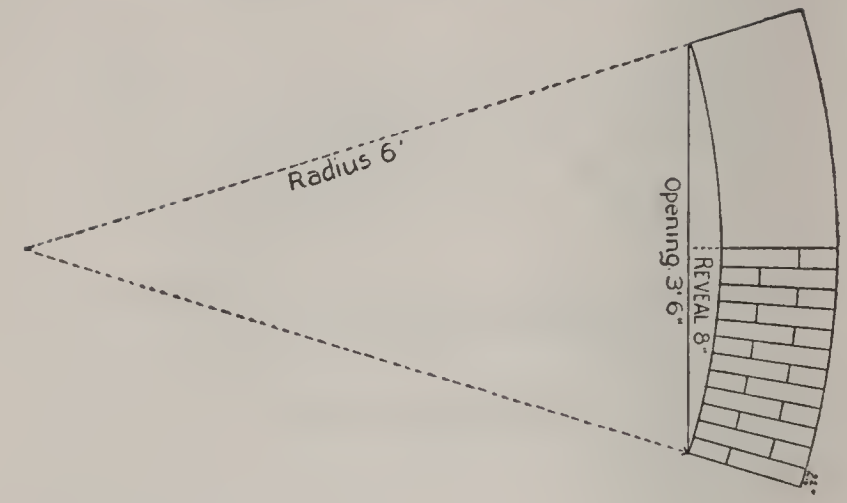
Give the Following Details:

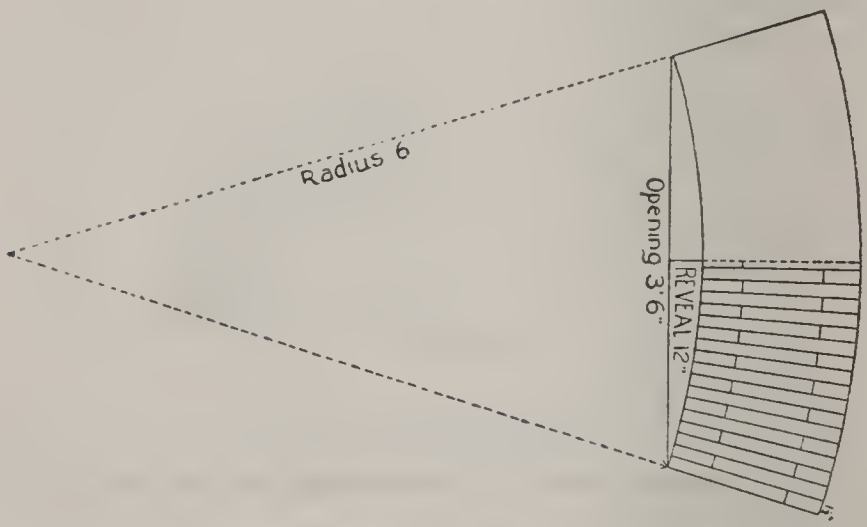
Width of opening.
Radius.
Depth of reveal or soffit.
Height of face.
Thickness of joints.

Of plain brick, $6.00 per hundred.

Of moulded brick, add the price of the moulded brick.

SEGMENT ARCHES.



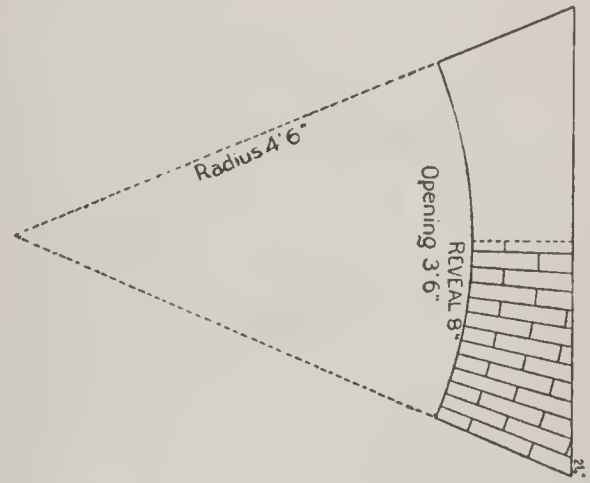


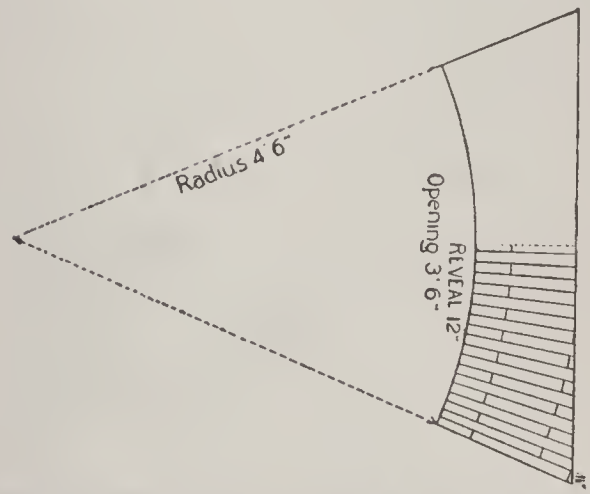
Give Following Details:

Width of opening.
Radius.
Depth of reveal or soffit.
Height of face.
Thickness of joints.

Of plain brick, $6.00 per hundred.
Of moulded brick add the price of the moulded brick.

SEGMENT ARCHES WITH FLAT TOPS.





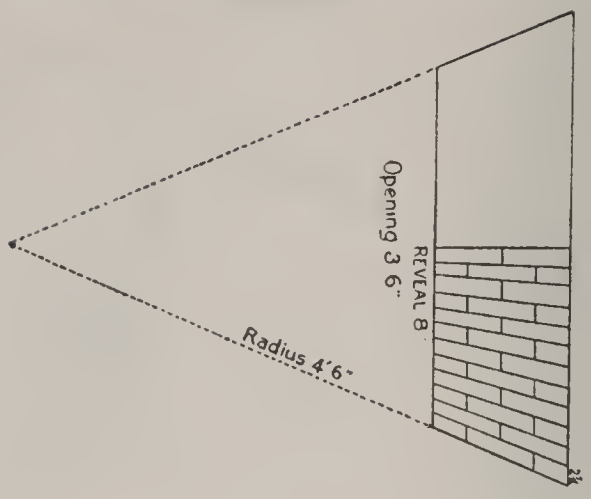
Give the Following Details:

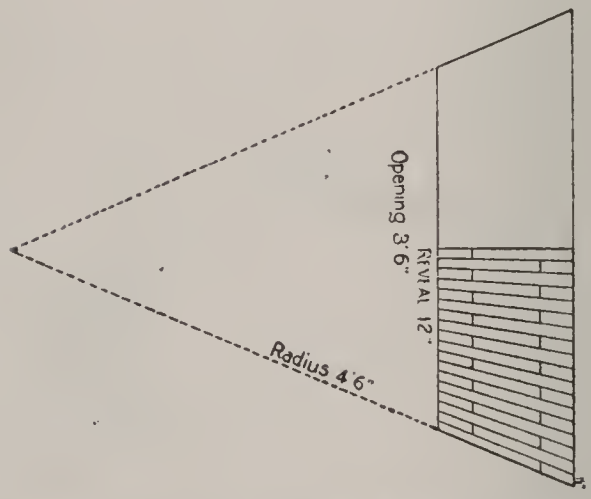
Width of opening.
Radius.
Depth of reveal.
Height of face.
Thickness of joints.

Of plain brick, $6.00 per hundred for all except the top course of brick. For the top course, $10.00 per hundred.

Of moulded brick, add the price of the moulded brick.

FLAT ARCHES.





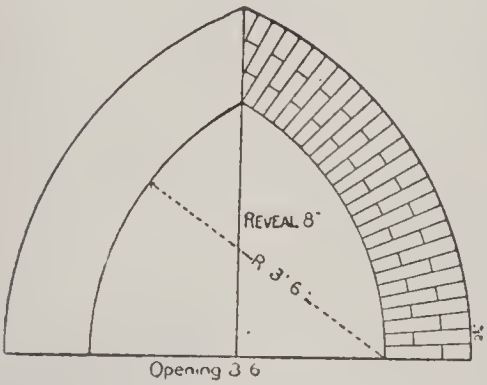
Give the Following Details:

Width of opening
Radius.
Reveal.
Height of face.
Thickness of joints.

Only of plain brick, $10.00 per hundred.

We make our Jack Arches of the same height as an even number of courses of brick in the wall unless otherwise specified. State how many courses high it is desired to have the arch.

GOTHIC ARCHES.



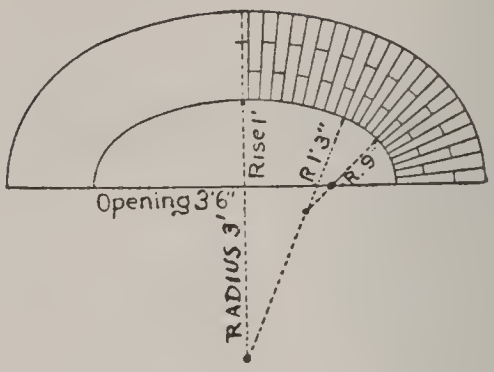
Give Following Details:

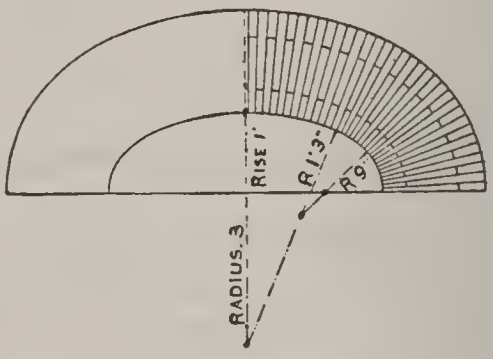
Width of opening.
Rise or spring of arch.
Radius.
Depth of reveal.
Height of face.
Thickness of joints.

Of plain brick $6.00 per hundred for all except brick beveled to center line; for these latter $10.00 per hundred.

Of moulded brick add the price of the moulded brick.

ELLIPTICAL ARCHES.





Give the Following Details:

Width of opening.
The three radii.
Rise.
Height of face.
Reveal.
Thickness of joints.

Of plain brick, $7.00 per hundred.

Of moulded brick add the price of the moulded brick.

Brick and Stone

The appearance of brick facings is often marred by the stone trimmings, though the best architects to-day do not use the two materials together in this manner. It was formerly the almost universal practice to have the sills, lintels, arches, as also the belt courses, cornices or other ornamentation of brick buildings of stone. This practice cannot be commended either for aesthetic or utilitarian reasons, and is now less common.

The appropriate trimming for brick buildings is the same material—burned clay, either in the form or classification of brick or terracotta. Most building stones discolor and are acted upon by atmospheric agencies, and the dirt and disintegrations wash down upon the brickwork, seriously marring the appearance and destroying the color scheme of the architect. Moreover, in a fire, the brick walls would often escape serious injury were it not for the destruction of the stonework combined with it.

Any color desired can now be obtained in brick and terracotta, and the unity and symmetry, as well as the beauty and durability, of the building can be secured by the use of these materials alone or together, both in body and trimmings.

Not to use brick in a stone facing, nor stone in a brick facing, and never to attempt to make brick look like stone, nor stone like brick, are safe rules to follow.

ARCHES, SILLS AND CORNICES.

All openings in brick buildings should be arched with brick or terracotta made or ground at the factory.

Special brick and terracotta pieces are now made for window sills that are preferable to stone.

Special brick or terracotta for cornices are more appropriate and more durable than stone or metal.

COLUMNS.

Veranda or porch columns of a brick house should be of brick or terracotta. Special forms with any degree of ornamentation desired can be obtained of the face brick or terracotta manufacturer.

FLOORS.

Pressed brick or tiles are used for floors of porches, hallways, kitchens, laundries, areas, etc., and are well adapted for the purpose.

WAINSCOTS.

Pressed brick are successfully used for wainscots of reception halls and public rooms, kitchens, laundries, etc., and admirably carry out any scheme of color or ornamentation appropriate.

MANTELS.

Brick mantels are now designed and specified by the best architects for the most expensive building, as well as the humblest cottage.

The quiet tone, restful colors and general appropriateness of unglazed brick for mantels is unquestioned. They can be made as simple or ornate as may be desired, and the brick are easily adapted to any scheme of decoration. They should be designed by the architect to harmonize with the room and conditions.

Brick for mantels, both plain and ornamental, should be specially selected. The cost of a brick mantel is not high, and none but the very best brick should be used. Highly colored, shiny, glazed brick are not so agreeable for every-day use—one wearies of their glaring brightness.

We make full size drawings of mantels and number every brick to correspond with numbers on the drawing, so that no mistake can be made in laying them up. We keep in stock a variety of plain and molded brick suitable for mantels, but only make up the mantels to order.

Orders for mantels should be sent in three to six weeks before shipment is desired.

Terracotta

The superiority of clay as a building material is especially evident in the product of the manufacturers of architectural terracotta. The plasticity of clay affords the artist a medium for producing the most delicate and elaborate ornamentations, for making accurate and enduring representation of the highest conceptions of his brain; and also the wide range of colors of this material make it possible to carry out any scheme of decoration that may be appropriate. Moreover, the artist can have the satisfaction of knowing that in well-burned clay his creations will be not only more delicate than in the non-plastic stone, but more durable.

For stone buildings, of course, the decorations should also be of stone, but for brick buildings the decorations should always be of brick or terracotta. Terracotta, however, should be restricted to its legitimate use of decorating a brick body. Terracotta blocks, made to resemble stone, for the body of the wall, are an offense to good taste.

Another advantage of terracotta ornamentation over stone is its light weight and facility of bonding with brick—being hollow, the brickwork extends into it and bonds it all into one solid substantial wall. For sills and projecting courses terracotta, as well as the special brick that we make for the purpose, has the advantage of being

always made with a drip groove underneath the projection, that drops the water clear of the wall, instead of like stone, letting it follow back and carry all the dirt down over the brickwork.

SETTING AND POINTING.

Terracotta is generally set by the brick masons. General directions for doing this are about as follows:

Set in Portland cement mortar. As soon as set the joints should be raked out to a depth of three-quarters of an inch to allow for pointing and to prevent chipping. The terra cotta should be built up in advance of the brick backing, one course at a time, and all the voids filled with mortar into which the brick are forced to bond with the wall.

After the walls are up the joints should be pointed with Portland cement, colored to correspond with the terra cotta or with the same mortar color as was used for the joints of the brick facing. Sometimes chloride of Barium solution is mixed with the cement mortar to prevent the exudation of the soluble salts of the cement.

TIME FOR MAKING.

Stone is sometimes used where terracotta ought to be used, because the owner or architect will not wait for the terracotta. This neglect to place the order for face brick and terracotta, either because the plans are not ready, or because too much time has been spent in dickering about prices, is one

of the most annoying things that the manufacturer has to contend with. He figures upon plans and makes prices often far enough in advance, but after long delay either the decision must be finally to use stone or the material that can be had quicker, or the order is given so late that the manufacturer has not time to do his best work, and is constantly importuned to rush everything.

Too much emphasis cannot be laid upon the importance of placing the order for all building material a safe time in advance—for special face brick or terracotta four to eight weeks before needed.

Roofing Tile

Clay tile make the most artistic and picturesque of all roofs, and possess a durability, when properly made, that greatly exceeds any other roofing material. The great range in color and shade that is possible enables any color scheme to be carried out; while the very attractive red shades, which are the most popular, do not fade out like slate. They are made in a variety of designs that range from simple dignity to very ornate, bold suggestions, that give decided character and individuality to the roof. They are thoroughly fireproof, and do not decay or rust out like wood or metal, nor require repainting or staining like tin or shingles.

REQUISITES OF A GOOD ROOFING TILE.

Roofing tile should absorb only a small amount of water, or less than 10 per cent in a 24-hour test, to be absolutely safe from frost disintegration. The exposure on the roof is so severe, being subject to the most violent extremes of temperature, that a hard-burned tile only should be employed to ensure a low absorption and a high durability. The tile should be reasonably true and straight and free from checks or cracks.

INSTRUCTIONS FOR LAYING ROOFING TILE.

As roofs require to be constructed to carry a load of 40 to 60 pounds to the square foot to safely withstand wind and snow loads, this is ample to carry tile, which weigh from 8 to 11 pounds per square foot (slate, the cheaper substitute, weighs 7 to 9 pounds per foot). Tile should be laid on close sheathing so that felt can be used under the tile to render the roof wind tight, otherwise fine dry snow is liable to work through the joints. The tile should be secured by galvanized or tinned nails, two nails to each tile, and the hip-rolls, cresting and finials should be bedded in Portland cement—stained.

The shingle design of tile are the simplest to lay, and any roofer or good carpenter can lay them. The more complex art tiles, like the Spanish, French, Celadon, etc., should only be laid by an expert tile roofer, to secure proper fit and alignment.

Tile are like slate or shingles in requiring at least one-quarter pitch to be weather-proof, while to appreciate their beauty and attractiveness the pitch should not be less than one-half, and steeper on ornate buildings.

Brick Bonding

The stability of brick walls depends much upon the bond—that is, the arrangement of the bricks adopted for tieing all parts of the wall together by means of the weight resting on the bricks. Foreign experts who have examined the brickwork in this country criticise us quite severely, but perhaps justly. They say we make the best brick in the world, and lay them the worst. In this latter they refer to the quality of the mortar used as well as the bond. In both of these, however, there is a manifest tendency towards improvement. Rapidity and cheapness of construction have been the governing considerations in much of our building. We are coming to see the instability and wastefulness of some of our methods, and are changing to others that give more durable and permanent results, even though the first cost may be more.

It is yet too common, however, to see a brick wall being laid a single course of stretchers on the outside five or more brick high, then a single course of stretchers on the inside and then the center filled in with brick in any convenient manner, the mortar being poor in quality and the brick being only partially imbedded in it. Moreover, to suit the convenience of the contractor in setting frames, joists or stone, or while waiting for these materials, parts of the wall are often run up above the rest, to which they are not afterwards properly tied.

COMMON BRICK BOND.

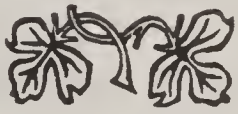
Common brick walls should be run up so as to keep all courses of brick level around the whole building, and to accurately preserve the bonding throughout the thickness and length of the wall. The strongest bond for common brickwork is undoubtedly the *English* bond, which consists of alternate courses of headers and stretchers, though for a wall 12 inches or more in thickness the *Flemish* bond, which consists of alternate headers and stretchers in every course, every header being immediately over the center of a stretcher below, is altogether the best bond and makes the best appearance on the face of the wall.

FACE BRICK BOND.

Where pressed brick are used for facing, the *Flemish* bond is the best, though it is not always practicable by reason of the improper difference in thickness of the common and pressed brick, and by reason of the increased cost from the larger quantity of pressed brick required. Neither of these difficulties, however, are as important as they are often represented, and should in most cases be overcome.

Most of our face brick are laid in what is known as the *plumb* bond, or sometimes the *American* bond, consisting of all stretchers with the joints in alternate courses exactly plumb over each other. The bonding to the wall is accomplished by the chipping off of the back corners of the face brick in every sixth or seventh course and laying

diagonal headers of common brick behind. Sometimes the face brick are tied to the common brick by means of metal wall ties, of which there are several styles on the market. Sometimes a special brick, 8x8, made by the face brick manufacturer, is used for the bonding of face brick to the wall. It remains true, however, that where the standard size 4x8 brick are used the *Flemish* bond is much to be preferred, not only because it really is the strongest bond, but because it relieves the monotonous effect of the uniform courses of stretchers.



Mortar

A few facts in regard to the preparation of mortar for brick-building should be more widely distributed. In this country the mortar is usually prepared at the building, and not enough attention is given to this important element, upon which depends so much of the strength and durability of the brickwork. It is said that in some countries of Europe much of the mortar for all purposes is prepared by machinery in factories in charge of specialists, and it would seem that in this way a uniformly good product could be insured.

LIME MORTAR.

Brick, especially in building construction, are generally laid up in lime mortar. The quality of lime mortar depends upon—1st. The quality of the lime and the manner of slaking. 2nd. The quality of the sand. 3rd. The proportions of lime paste and sand and the thoroughness of the mixture.

LIME.

Good lime is characterized as follows:

1. Freedom from cinders and clinkers, with not more than 10 per cent of impurities.
2. In hard lumps, with but little dust.
3. Slakes readily in water, forming a fine, smooth paste, without any residue.
4. Dissolves in soft water.

SLAKING.

To slake lime for mortar place the lumps in a layer 6 or 8 inches deep in a water-tight box, and pour upon the lumps a quantity of water 2½ to 3 times the volume of the lime. Too much water reduces the slaked lime to a semi-fluid condition and thereby injures its binding qualities. On the other hand, not having used enough water in the first place the addition of more after the slaking has well progressed and a portion of the lime is already reduced to powder, chills the lime and renders it granular and lumpy. The lime should not be stirred while slaking, hence it is better to put a part of the water in the box first.

Lime should be slaked at least one day before it is incorporated with the sand. Lime paste can be kept an indefinite time without deterioration if protected from contact with the air.

SAND.

Sand for mortar should be sharp, clean and coarse.

Sand should be *sharp*—i. e., the grains should be angular, because angular grains are rougher and the lime or cement adheres to them better, and because angular grains offer greater resistance to moving one on the other under compression.

Sand should be *clean* for the strongest mortar, since an envelop of loam or organic matter about the sand grains prevents the adherence of the lime or cement.

Sand should be *coarse,* since coarse sand takes more lime or cement and makes the strongest mortar.

Sharpness of sand can be determined approximately by rubbing a few grains in the hand, or, better, by examining it through a small lens.

Cleanliness of sand may be judged by pressing it together in the hand while it is damp; if the sand sticks together when the pressure is removed it is unfit for mortar. Or the cleanliness may be determined more accurately by washing.

Coarseness of sand is accurately tested by passing it through sieves of different mesh.

Specifications are generally not definite enough for the best work, as they rarely go further than simply: "The sand shall be sharp, clean and coarse."

MIXING LIME MORTAR.

The mixing of mortar is a simple process, but is often done poorly through the ignorance or carelessness of the workman. The volume of lime paste in common mortar should be but slightly in excess of what is sufficient to coat all the grains of sand and to fill the voids between them. This generally requires a proportion of 2½ to 3 volumes of sand to 1 of lime paste. The sand is spread evenly over the paste and the ingredients are thoroughly mixed with hoe or shovel, a little water being added occasionally if the mortar is too stiff.

Lime mortar will not set when excluded from the air; hence it is not fit for thick walls, nor for masonry construction under water or in soil that is constantly wet. For such uses or for structures requiring great strength or subject to shock, cement mortar should be used.

Cement

Cements do not slake or break up like lime, and their paste sets very quickly in air or water. They are of two classes:

1. Natural cements.
2. Artificial cements.

Natural cements are made from rock or marl in its natural state without the addition of other ingredients.

Artificial cements, of which the most useful is Portland cement, are made from an artificial mixture of materials, containing from 75 to 80 per cent of carbonate of lime and 20 to 23 per cent of clay.

The rock or substance of both natural and artificial cements are burned in kilns specially constructed for the purpose, and the calcined product is then pulverized.

Natural cements are calcined at a lower temperature than Portland cement. Natural cements weigh about two-thirds as much as Portland cement, set quicker and have less ultimate strength.

TESTING CEMENTS.

Natural as well as Portland cements from different factories, or even from the same factory, vary greatly in quality owing to difference in the materials and the care exercised in their manufacture. Hence a knowledge of cements and the methods of testing them must form a part of the

education of every architect and engineer. Only a few brief directions can be given here. Cements are tested for color, fineness, time of setting, tensile strength, constancy of volume, proper burning, etc.

Color of cement indicates very little of its quality, though variations in shade of any given brand may indicate difference in quality. In Portland cement gray or greenish gray is generally considered best—bluish gray indicating a probable excess of lime and brown an excess of clay.

Fineness is an important quality of cement—the finer the powder the better it will surround and cover the sand, the more sand can be used, and hence the greater economy.

Time of setting is often a valuable test for special work. Cement is said to be *set* when it resists the impression of the finger nail, or has lost its plasticity and cannot be moved without fracture.

Tensile Strength is the most important test of cement. This test is generally made by those who have a technical knowledge of the subject and special apparatus for the purpose, though the Fairbanks Company make special testing machinery for this purpose that can be used by anyone.

The test for *proper burning* is one that should be made daily at the factory by a determination of the specific gravity. The *specific gravity* of natural cement varies from 2.75 to 3.05, and of Portland cement from 3.05 to 3.17.

For *constancy of volume*, for some uses an important quality, the boiling test is used. By this

test is detected excess or deficiency of lime, excess of magnesia, under burning, etc.

CEMENT MORTAR.

For ordinary use in small quantities cement mortar should be mixed about as follows:

Spread about half the sand required evenly over the bed of the mortar box and then spread the dry cement evenly over the sand, and spread the remaining sand on top. Thoroughly mix the dry sand and cement with hoe or shovel. When thoroughly mixed, the color will be uniform throughout. The dry mixture should be shoveled to one end of the box and water poured in at the other end. The dry mixture is then drawn down with a hoe, small quantities at a time, and mixed with enough water to form a thick paste. Natural cement requires more water than the Portland, and the fresh ground more than the stale. An excess of water is better than a deficiency.

The proportion of sand should vary according to the kind of cement and the kind of work for which the mortar is to be used. For the best results the cement paste should be just sufficient to coat the grains and fill the voids of the sand. For natural cement the proportion of sand to cement by measurement should not exceed 3 to 1, or for first-class work 2 to 1. Portland cement mortar may contain 4 of sand to 1 of cement for ordinary mortar; 3 to 1 for first-class mortar.

Always use clean water. Cold water retards setting; hot water hastens this action. Quick-setting cements require more water than do slow-

setting brands, and finely ground cement more than those that are coarse ground.

"Natural cement mortar in 12 months is about equal to Portland cement mortar in 1 month."

Portland cement attains its greatest strength in water. Natural cement attains its greatest strength in air.

LIME WITH CEMENT.

The addition of lime to cement is recommended by the Association of German Portland Cement Manufacturers when the work is not to be done in water or wet ground. The substitution of 10 to 20 per cent. of lime paste for an equal volume of the cement paste does not materially decrease the strength of the mortar and gives it greater firmness and more rapid hardening. The economy of using lime with cement is greater with Portland than with natural cement, owing to the greater cost of the former.

The mortar for the "ordinary brickwork" of the United States public buildings is composed of "one fourth cement, one-half sand and one-fourth lime."

Mortar for Face Brick

Mortar for laying face brick should be specially prepared from *lime putty* and finely screened sand. For white mortar the sand should be white. Mortar for face brick should contain more lime than that used for the interior of the wall.

COLORED MORTARS.

Colored mortars are now generally employed for the laying of face brick. The proper color to use for a given colored brick is a question often asked of the brick manufacturer, and though this is a point that should be determined by the architect, yet a few observations may be pertinent.

The effect of using different colors of mortar joints upon the same shade of brick is so marked as to give the impression that the brick are not of the same shade.

With rough, common brick a mortar joint of nearly the same color of the brick is often used so as to conceal defects of the brick or of the laying, or sometimes to get the effect of a mass of color by concealing the joints. This practice, however, cannot be commended for fine face brick—the effect being too much that of a painted wall. The other extreme, also, of a mortar color strongly contrasting with the color of the brick so as to emphasize the joints should be condemned. The very white joint with a bright, deep red brick has the sanction of long years of use before other

colors, either of brick or mortar, were to be had, but the practice cannot be supported upon aesthetic grounds.

If the question of color of mortar is capable of being reduced to an artistic standard, and yet allow sufficient variation for individual taste, it would seem that the contrast between the color of the brick and the color of the joint should be just sufficient to give prominence and character to the brick, to bring the brick in the foreground, with the joint in the background. Thus the mortar joints should be somewhat darker than the brick, though a pure black mortar should be seldom, if ever, used.

Colored mortar should never be made with freshly slaked lime, but only with lime putty at least three days old. The color should be thoroughly and evenly mixed with the putty before the sand is added.

THICKNESS OF MORTAR JOINTS.

Common brick should be laid in a bed of mortar at least 3-16, and not more than 3-8, of an inch thick; that is, the joints should be as thin as will insure a uniform bearing and allow rapid work in spreading the mortar. Since common brick are somewhat rough and uneven, it is often specified that the height of 7 courses of brick laid in wall shall not exceed by 2 inches the height of 7 courses of the same brick piled up without mortar. Every joint and space in the wall not occupied by other materials should be filled with mortar.

Face brick are generally of uniform thickness and true and even, so that they can be laid with an 1-8 inch joint if desired. The 1-8 inch joint, however, is not used nearly so much as formerly since a thicker joint is considered better for strength and beauty. The usual specifications for face brick of standard size is a joint 3-16 inch thick, and for Roman size 1-4 inch thick. Thicker joints are sometimes used for special effects.

STRIKING THE JOINTS.

The appearance of the brickwork is affected a good deal by the manner of striking the joints, and this should always be clearly specified.

For outside walls and inside walls, where the brick are left exposed, the joint should be struck

FIG. 1.

FIG. 2.

as shown in Fig. 1, not as in Fig. 2, though the latter, unfortunately being easier to make, is more common.

FACE BRICK JOINTS.

Face brick joints are struck more carefully, generally in manner illustrated in Figs. 3, 4 and 5.

FIG. 3.

FIG. 4.

FIG. 5.

The joints are well filled and then raked out and pointed or finished when several brick have been laid.

The beaded joint, Fig. 4, cannot be commended, though it is often used. The fluted joint, Fig. 3, is more artistic and durable. The recessed joint, Fig. 5—joint about ¼ to ⅜ inch thick and raked out ¼ to ⅜ inch from surface of wall—gives a very artistic effect and gives the character and individuality seen in some European brickwork, but should be used only with first-class brick and mortar.

PANEL BRICK.

Face brick are sometimes made with a panel sunk into one side of the brick, to be laid uppermost, to give a better key for the mortar. This is a desirable feature, but manufacturers do not make such brick, because if they are not specified the contractor will not buy them.

WETTING BRICK.

Much poor brick work is caused by the brick being laid too dry. Most brick, especially common brick, absorb water from the mortar so rapidly that the mortar will not set properly. There is little danger from common brick being too wet, but as the wetting of the brick takes labor and makes it harder on the hands of the mason, the wetting is often neglected, unless insisted upon by the architect.

Face brick being more dense and harder burned, do not need so much wetting. In fact, if they are

soaked in water there is a danger that certain salts in the brick may be dissolved, and upon evaporation, be brought to the surface, disfiguring the wall by the unsightly efflorescence. A face brick should be wetted by being immersed in water and immediately removed.

LAYING BRICK IN FREEZING WEATHER.

Brick should never be laid when the temperature is below freezing. When it is necessary to lay brick in freezing weather the wall should be enclosed in a temporary structure, so that the mortar can be kept from freezing. This precaution is generally disregarded. but is now insisted upon by the best architects.

The top of a brick wall should always be protected at night, or when left, so as to prevent rain from washing the mortar out of the joints and staining the wall, and also to prevent the face brick from being soaked with water and efflorescing.

CLEANING DOWN.

Soon after the walls are completed the facing should be washed and scrubbed with muriatic acid and water until all stains are removed. At the same time all open joints should be pointed and the entire wall put in perfect condition.

Efflorescence

The most objectionable feature of pressed brick facings is the disfigurement that often occurs from the mineral salts that have been dissolved out of the brick or mortar by the water they have absorbed, and that, upon evaporation of the water, are deposited in minute crystals upon the surface of the wall. On red brick this efflorescence is white, while upon the cream, buff and white brick the efflorescence is orange or green.

The white efflorescence has been analyzed many times and shown to be mainly sulphate of lime, magnesia and alkalies. The green efflorescence, however, which is not so abundant nor so injurious to the brick, is not so well understood as to its composition and origin. German chemists, notably the late Dr. Seger, have investigated this efflorescence thoroughly and found it to be a salt of Vanadium, principally vanadiate of potassium.

CAUSE AND PREVENTION.

The origin of this troublesome efflorescence is generally in the clay itself, which contains among its impurities more or less of these sulphates or their bases, the sulphur coming in the process of manufacture from pyrites either in the clay or in the fuel, or in both. Sometimes, however, the efflorescence may be due to sulphates in the mortar.

Where the source of the trouble is in the clay, it can be prevented by special care in the process of manufacture—in the preparation of the clay and in the drying and burning of the brick.

There is no danger from efflorescence in properly made brick, if the brick have not been soaked with water before laying or during the laying, or if the construction of the walls is such as not to allow the brick to receive only the water that rains upon their exposed faces.

Beware of leaky sills and cornices.

Use *A* grade SHAWNEE BRICK, which are properly made and burned, and are practically impervious.

Data for Estimates

ARCHITECT'S FEES.

Many architects have their own special rates for service. The American Institute of Architects have adopted the following schedule of minimum charges:

For full professional services (including supervision), five per cent. upon the cost of the work.

For partial services, or in case of the abandonment or suspension of the work the charge is as follows: For preliminary studies, individual or competitive, the rate is equal to 2½ times the square root of lowest cost; preliminary studies, general drawings and specifications, 2½ per cent. of cost; preliminary studies, general drawings, specifications and details, 3½ per cent. of cost.

For works that cost less than $10,000 a special rate in excess of the above.

For alterations and additions, an additional charge to be made.

Necessary traveling expenses to be paid by the client.

NUMBER OF BRICK REQUIRED.

A wall built of common brick, standard size (2¼x8¼x4), with mortar joints ⅜ inch, will require for every square foot of outside superficial area:

7 bricks for a 4-inch wall
14 bricks for a 8-inch wall
21 bricks for a 13-inch wall
28 bricks for a 17-inch wall

and so on, or about 450 brick for every cubic yard of masonry.

The estimate for face brick is about 7½ brick for each foot of superficial area, the size of the brick being $2\frac{5}{16} \times 8\frac{3}{16} \times 4$, with 3-16 inch joints, the brick being laid up in American bond.

For Flemish bond there will be required a little less than 10 brick per foot, but, of course, 2½ of these brick will take the place of an equal number of common brick.

In making estimates of the number of brick required, allowance must be made for breakage and for waste in cutting. In buildings about 3 per cent. should be allowed for common brick and 5 per cent. for face brick.

TERRACOTTA.

Not much assistance can be given in estimating the cost of terracotta, as so much depends upon the character of the ornamentation and how much the same design is repeated, and upon the distance from the factory, etc. Stock patterns from the face brick manufacturer or from the terracotta manufacturer can be obtained at a much lower cost than the same ornamentation in stone. "Single pieces or plain sills and lintels cost about the same as stone, when the rough stone can be delivered at a price not exceeding 90 cents per cubic foot."

ROOFING TILE.

The cost of tile will vary largely, as in brick or terracotta, with the design, quality, distance from factory, etc., and ranges from $5.00 to $25.00 per square at the factory. The cost of laying tile will vary from $2 to $5 per square for labor for the simple designs to $6 to $12 for the more ornate tiles. Nails, felt, cement and flashings will require from $1 to $5 additional. The more the roof is cut up by gables, dormers, towers, etc., the greater the cost in cutting, fitting, etc. Special tile are made to fit the taper on round towers, and for the convex surfaces of domes, etc.

The total cost of roofing tile laid complete on the roof will, therefore, vary according to local conditions, design and quality of the tile, from $10 to $50 per square, though a good grade of shingle tile can usually be laid for about $15 per square on ordinary roofs.

LIME MORTAR.

A cubic yard of brick masonry will require about one-third of a cubic yard of mortar, or it will take about three-quarters of a cubic yard of mortar to lay a thousand brick.

To make a cubic yard of mortar requires about one barrel of unslaked lime, weighing about 230 pounds, and about one ton of sand. The volume of the resulting mortar is about equal to the volume of the sand alone.

So there should be estimated to lay a thousand brick about 175 pounds of unslaked lime and about 1,600 pounds of sand.

CEMENT MORTAR.

It will take about two barrels of Portland cement, weighing about 375 pounds each, and about .85 of a cubic yard of sand to make one cubic yard of Portland cement mortar.

There will be required for first-class work about two and three-quarter barrels of natural cement, weighing about 300 pounds each, and three-quarters of a cubic yard of sand to make one cubic yard of natural cement mortar.

Calculating half of a cubic yard of mortar to one thousand brick, it will require for each thousand brick about one barrel of Portland cement or one and three-eighths barrels of natural cement and half a ton of sand.

MORTAR COLORS.

For staining mortar for 1,000 brick there will be required about

50 pounds of red color,
40 pounds of Buff or brown,
30 pounds of black.

Prices of Shawnee Brick

The prices given in this catalogue are for each brick at our works.

Small quantities, in less than carloads, ordered shipped separately must be packed in barrels.

For barrels and packing an extra charge of 35 cents per barrel is made.

All Arch Brick are packed in barrels or boxes without extra charge.

Brick selected for Mantels, 1 cent each additional to price in catalogue.

On shipments of less than 20 barrels drayage must be charged.

The minimum *Carload* of brick east of Chicago is 40,000 pounds, about 7,000 brick.

It is generally cheaper to ship 2,000 or more brick as a carload than to pack and ship in barrels.

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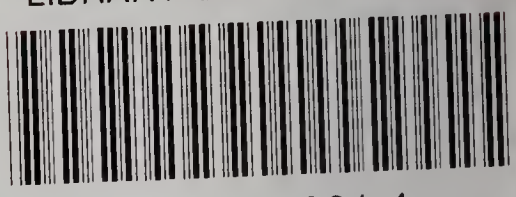

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